

PATENT SPECIFICATION

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(54) LIQUID-LEVEL INDICATORS

(71) We, N.S.F. CONTROL LIMITED, formerly known as Holzer Controls Limited, a British Company of Fence House, Houghton-le-Spring, County Durham DH4 5RG, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to liquid level indicators particularly, but not exclusively, for use in road vehicles.

15 An indicator, according to the invention, includes a generally cup-shaped cap adapted for attachment to a container which, in use, has therein the liquid to be monitored, an electrically insulating member depending from the cap, a first conductive member projecting from one end of said insulating member for insertion in the liquid, and a conductive part extending around and in physical contact with at least a portion of said insulating member and terminating short of said one end of the insulating member.

25 The invention further resides in a liquid level indicating system using an indicator as specified above, in which the conductive member and the liquid form part of a d.c. path between a supply line and earth, and said conductive part is maintained at a potential between the potential of the supply line and earth.

In the accompanying drawings:—

35 Figure 1 is a part-sectional side view of a liquid level indicator in accordance with one example of the invention, and also illustrates part of a circuit associated with the indicator;

40 Figure 2 is an inverted plan view of Figure 1, and

Figure 3 is a view similar to Figure 1 of another example.

45 Referring to Figures 1 and 2, there is provided a body in the form of an electrically insulating, generally cup-shaped cap 11 which is internally screw threaded for connection to an earthed or electrically

insulating container (not shown), which can by way of example be a brake fluid reservoir in a road vehicle. Extending through the cap 11 is a member 12 formed from rubber or other electrically insulating material, the part of the member 12 which will be within the container in use being formed with a slot 13 so as to define a pair of limbs 14, 15 which will extend into the container. Carried by the limbs 14, 15 are respective depending conductive member 16, 17 to which are attached leads 18, 19 respectively extending by way of the member 12 to a position outside the container.

The liquid level indicator system with which the arrangement shown in Figures 1 and 2 is associated can take any one of a variety of known forms, in which a d.c. supply path is established from a positive supply line 21 to an earthed supply line 22 by way of the lead 18, the member 16, and then via the liquid to the member 17 and the lead 19. The resistance of the path through a given liquid will depend on the level of liquid within the container, and this resistance can be sensed in a number of ways to give an indication if the liquid level is below the required level. Alternatively in a single probe system as shown in Figure 3 where the container 27 is metallic or otherwise conducting the current may pass through the liquid via the single probe 20 directly to the container 27.

In the examples described above, the container for the liquid may be earthed, and it has been found that in some circumstances current can flow along the surfaces of any of the insulating materials, for example in the members 11, 12, so that an electrical path to earth is established. Also in some cases an electrical path can be established across the slot 13 between the members 16, 17 of the example shown in Figures 1 and 2. In order to overcome this problem, a conductive part in the form of a guard ring 23 is employed, this guard ring 23 surrounding and gripping the limb 15 in the arrangement of Figure 1 and surrounding and gripping the part of the member 12 defined

within the container 27 in the arrangement of Figure 3. The guard ring 23 is connected by way of a lead 24, which may extend through the cap 11, and a current limiting resistor 28 to a potentiometer chain 25, 26 bridging the lines 21, 22 so that the guard ring 23 is maintained at any chosen potential between that of the lines 21, 22. It is found that in this way flow of current between the members 16, 17 or via the members 11, 12 and the container to earth is prevented.

WHAT WE CLAIM IS:—

1. A liquid level indicator including a generally cup-shaped cap adapted for attachment to a container which, in use, has therein the liquid to be monitored, and electrically insulating member depending from the cap, a first conductive member projecting from one end of said insulating member for insertion in the liquid, and a conductive part extending around and in physical contact with at least a portion of said insulating member and terminating short of said one end of the insulating member.

2. An indicator as claimed in Claim 1, wherein the insulating member support is a further conductive member spaced from the first conductive member.

3. A liquid level indicator comprising the

combination and arrangement of parts substantially as hereinbefore described with reference to and as shown in Figures 1 and 2 of the accompanying drawings.

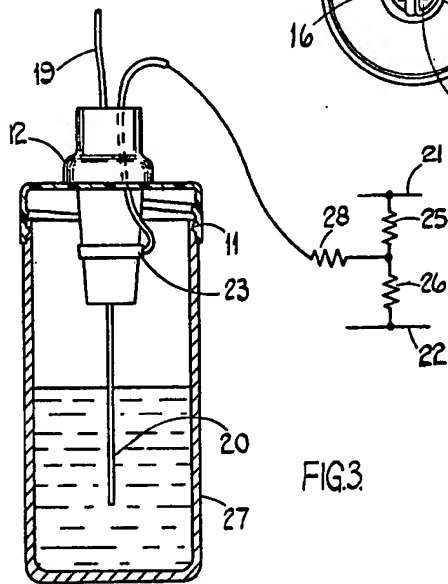
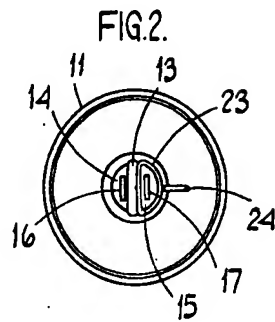
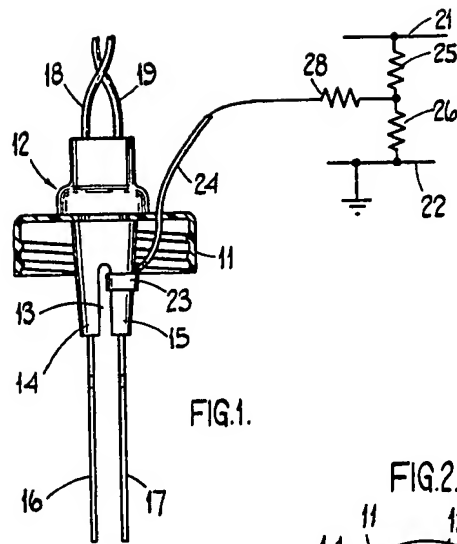
4. A liquid level indicator comprising the combination and arrangement of parts substantially as hereinbefore described with reference to and as shown in Figure 3 of the accompanying drawings.

5. A liquid level indicating system using an indicator as claimed in any one of the preceding claims, in which the conductive member and the liquid form part of a d.c. path between a supply line and earth, and said conductive part is maintained at a potential between the potential of the supply line and earth.

6. A liquid level indicating system substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.

7. A liquid level indicating system substantially as hereinbefore described with reference to Figure 3 of the accompanying drawings.

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[54] **PROBE FOR CONTROLLING THE LEVEL OF ELECTRICALLY CONDUCTIVE LIQUIDS**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 327,026, Jan. 26, 1973, abandoned.

[30] **Foreign Application Priority Data**

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[51] Int. Cl.² G01F 23/22

[58] Field of Search 73/304 R, 304 C, 313; 340/244 C; 324/65 R, 65 P

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[57]

ABSTRACT

In a device or probe for controlling the level of electrically conductive liquids in a container having an electrode rod, an insulating body comprising a plurality of mica disks surrounding the electrode rod, and intermediate distance spacers also surrounding the electrode disposed between the links. The disks and spacers are mounted in the container between the separating wall and the electrode.

5 Claims, 4 Drawing Figures

